

Total No. of Questions : 5]

SEAT No. :

PE1499

[Total No. of Pages : 2

[6502]-301

S.Y.B.Sc. (Computer Science)

**CS - 231 : DATA STRUCTURES AND ALGORITHMS - I
(Revised 2019 Pattern) (Semester - III) (Paper - I) (23121)**

Time : 2Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicates full marks.*

Q1) Attempt any 8 of the following.

[8×1=8]

- a) Define space complexity.
- b) What is Big Oh (O)?
- c) Binary search is faster than linear search-state True/False.
- d) What is the time complexity of Quick sort?
- e) Define linked list.
- f) Write any two applications of linked list.
- g) What is recursion?
- h) Write postfix expression for given infix expression $(x+y) * Z$
- i) "Queue follows FIFO order" state True/ False.
- j) What is queue?

Q2) Attempt any 4 of the following.

[4×2=8]

- a) What is stack underflow and stack overflow.
- b) Differentiate between linear queue and circular queue.
- c) What is linear search? List linear search variations.
- d) Define data structure and List any two types of it.
- e) Write node structure of doubly linked list.
- f) List 3 asymptotic notations along with their usage.

P.T.O.

Q3) Attempt any two of the following : **[2×4=8]**

- a) Write 'C' function for implementing Linear search algorithm.
- b) Write a 'C' function to create doubly linked list.
- c) Write functions definition in 'C' for push () and pop () to implement static stack.

Q4) Attempt any two of the following : **[2×4=8]**

- a) Explain static implementation of queue.
- b) Sort the following elements using merge sort. 38, 27, 43, 3, 82, 9
- c) Evaluate the following postfix expression using stack: PQ-RS*/ given P=2, Q=10, R=4 and S=1.

Q5) Attempt any one of the following : **[1×3=3]**

- a) What is generalized linked list? Represent the given List (a,(b,c),d)
- b) Show the contents of queue at each step of the following statements:
 - i) addQ(P)
 - ii) addQ(Q)
 - iii) removeQ()
 - iv) addQ(R)
 - v) removeQ()
 - vi) addQ(S)
 - vii) addQ(T)



Total No. of Questions : 5]

SEAT No. :

PE-1500

[Total No. of Pages : 2

[6502]-302

S.Y. B.Sc. (Computer Science)
CS-232 : SOFTWARE ENGINEERING
(Revised 2019) (Semester - III) (23122)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

Q1) Attempt any Eight of the following :

[8 × 1 = 8]

- a) List the objective of structured analysis.
- b) What is Software?
- c) List any two advantages of DFA.
- d) Justify Requirement analysis is iterative process.
- e) What is XP?
- f) List architectural design elements.
- g) What is meant by requirement modeling?
- h) Define Artifacts
- i) What is class & object.
- j) What does ASD stands for?

Q2) Attempt any four of the following :

[4 × 2 = 8]

- a) Define any four agile principles.
- b) What is requirement elicitation?
- c) Write advantages of Waterfall model.
- d) List any four types of UML diagrams.
- e) What is meant by developement process.

Q3) Attempt any two of the following :

[2 × 4 = 8]

- a) Explain the layers of Software Engineering.
- b) State Difference between structured & unstructured Interviews.
- c) Explain unbrella activities in detail.

P.T.O.

Q4) Attempt any two of the following :

[2 × 4 = 8]

- a) Draw use case diagram for Online Movie Ticket Booking.
- b) Explain RAD model with its advantages and disadvantages.
- c) What are design elements? Explain any two elements in detail.

Q5) Attempt any one of the following :

[1 × 3 = 3]

- a) Draw Activity diagram of ATM.
- b) What is modularity? Explain its benefits?



[6502]-303

S.Y. B.Sc. (Computer Science)

MATHEMATICS

MTC-231 : Groups and Coding Theory

(Rev. 2019) (Semester - III) (23221) (Paper - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Non-programmable scientific calculator is allowed.

Q1) Attempt any five of the following :

[5 × 2 = 10]

- a) Prepare composition table of addition for $(\mathbb{Z}_6, +_6)$
- b) Find the hamming distance between x and y , where $x = 1101010$, $y = 1000011$.
- c) Let $G = \{1, -1, i, -i\}$ be a group, find order of i .
- d) State whether the following statement is true or false. Justify 'Every abelian group is cyclic group'.
- e) Let $a, b, c, \in \mathbb{Z}$, if a/b and a/c then show that $a/(b + c)$
- f) Find any two proper subgroups of $(\mathbb{Z}_{12}, +)$.
- g) Give an example of a relation on $A = \{1, 2, 3\}$ which is symmetric but not transitive.

Q2) Attempt any three of the following :

[3 × 5 = 15]

- a) Let $a, b, x \in \mathbb{Z}$, if $a \equiv b \pmod{n}$ then, prove that
 - i) $ax \equiv bx \pmod{n}$
 - ii) $(a + x) \equiv (b + x) \pmod{n}$
- b) Using RSA method with $p = 2$, $q = 3$ and $e = 3$, encrypt the message 'EFG'.
- c) Let R be a relation on $\mathbb{Z}$ defined by xRy if and only if, $5x + 8y$ is divisible by 13, for $x, y \in \mathbb{Z}$, show that R is an equivalence relation on $\mathbb{Z}$.
- d) If $\mu = (1 \ 4 \ 3)(2 \ 6)$ and $\tau = (3 \ 4 \ 7)(2 \ 5)$ in S_8 . Find $\mu\tau\mu^{-1}$.
- e) How many subgroups does $\mathbb{Z}_{20}$ have? List a generator for each of these subgroups. Write all subgroups.

P.T.O.

Q3) Attempt any one of the following :

[1 × 10 = 10]

- a) Find *g.c.d.* of 3997 and 2947 and express it in the form $d = 3997 m + 2947 n$ for some $m, n \in \mathbb{Z}$.
- b) i) Let $G = \mathbb{Z}$, the set of integers. Define $*$ as $a * b = a + b - 2$, for all $a, b \in \mathbb{Z}$ show that $(\mathbb{Z}, *)$ is an abelian group.
- ii) Determine the group code $e_H : B^3 \rightarrow B^6$ whose given parity check matrix is,

$$H = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$



Total No. of Questions : 3]

SEAT No. :

PE-1502

[Total No. of Pages : 2

[6502]-304

S.Y. B.Sc. (Computer Science)

MATHEMATICS

MTC-232 : Numerical Techniques

(Revised 2019) (Semester - III) (Paper - II) (23222)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Non-Programmable Scientific calculator is allowed.

Q1) Attempt any Five of the following :

[5 × 2 = 10]

- a) Obtain $\sqrt[3]{20}$ by Newton's Raphson method. With two iteration. Take $x_0 = 2.5$.
- b) Evaluate $\Delta^2(a^{2x+3})$ (Take $h = 1$).
- c) Find relative error of the number $\frac{1}{3}$ whose approximate value is 0.33.
- d) Given that $f(0) = 1$, $f\left(\frac{1}{4}\right) = 0.94$, $f\left(\frac{1}{2}\right) = 0.8$, $f\left(\frac{3}{4}\right) = 0.64$, $f(1) = 0.5$,
with $h = \frac{1}{4}$. Find $\int_0^1 f(x) dx$ by Trapezoidal rule.
- e) Given that $y(3) = 46$, $y(5) = 66$, $y(7) = 81$, $y(9) = 93$ and $y(11) = 101$. Find Newton's backward difference table.
- f) Given that $\frac{dy}{dx} = x^3 + y^3$ with $y(0) = 1$. Find $y(0.1)$ by Euler's method. (Take $h = 0.1$)
- g) Write Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule for numerical integration.

P.T.O.

Q2) Attempt any Three of the following :**[3 × 5 = 15]**

- a) Using Euler's modified method find the value of y at $x = 0.1$ with $h = 0.1$ and $\frac{dy}{dx} = 1 - y, y(0) = 0$.
- b) Derive General Quadrature formula for numerical integration.
- c) Find the value of y at $n = 8$ using Newton's divided difference formula from the data given below.
- | | | | | |
|-------|----|-----|-----|-----|
| x : | 4 | 5 | 7 | 10 |
| y : | 48 | 100 | 294 | 900 |
- d) Using Simpson's $\frac{3^{\text{th}}}{8}$ rule. Evaluate $\int_0^6 \frac{1}{1+x^4} dx$ (Take $h=1$).
- e) The population of a town in the decadal census was given below. Estimate the population for the year 1895 by using Newton's forward difference interpolation formula.
- | | | | | | |
|---------------------|------|------|------|------|------|
| Year (x): | 1891 | 1901 | 1911 | 1921 | 1931 |
| Population (y): | 46 | 66 | 81 | 93 | 101 |
- (In thousands)

Q3) Attempt any One of the following :**[1 × 10 = 10]**

- a) Given that $\frac{dy}{dx} = y - x$, with $y(0) = 2$. Find $y(0.1)$ and $y(0.2)$ by using Runge - kutta method of fourth order.
- b) i) Find the real root of the equation $f(x) = x^3 - 9x + 1 = 0$ by Regula falsi method correct to three decimal places.
- ii) Find the polynomial of degree 2 by using Lagranges interpolation formula for following data :
- | | | | |
|----------|---|----|----|
| x : | 1 | 3 | 4 |
| $f(x)$: | 1 | 27 | 64 |



Total No. of Questions : 5]

SEAT No. :

PE-1503

[Total No. of Pages : 2

[6502]-305

S.Y. B.Sc. (Computer Science)

ELECTRONIC SCIENCE

ELC-231 : Microcontroller Architecture & Programming
(2019 Pattern) (Semester - III) (23321) (Paper - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any *THREE* questions from Q.2 to Q.5.
- 3) Figures to the right indicate full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Use of calculator is allowed.

Q1) Attempt any five :

[5 × 1 = 5]

- a) What is the size of internal RAM of 8051?
- b) Name Non-maskable interrupt of 8051 microcontroller.
- c) Write at least one instruction with no operand with it.
- d) Enlist any two assembler directive of 8051 microcontroller.
- e) Which special function register is used to define priority of an interrupt in 8051 microcontroller.
- f) Define Baud rate in Serial Communication.

Q2) Answer the following :

[2 × 5 = 10]

- a) Write an 8051 C program to generate 1kHz square waveform on port pin P2.5 using Timer0, mode2 (Assume XTAL = 12MHz) [5]
- b) i) Which ports are used in external memory addressing. How many address bits are required to interface external memory of 16K EPROM and 8K RAM with 8051 Microcontroller. [3]
ii) Define Resolution and Linearity with respect to ADC. [2]

P.T.O.

Q3) Answer the following : **[2 × 5 = 10]**

- a) Differentiate between Microprocessor and Microcontroller. **[5]**
- b) i) Write assembly language program to blink LED continuously. **[3]**
ii) Enlist Interrupts with their vector addresses. **[2]**

Q4) Answer the following : **[2 × 5 = 10]**

- a) Draw bit format of TCON register and write significance of each bit. **[5]**
- b) Draw a block diagram of interfacing of stepper motor and write a 8051 C program to rotate motor in clockwise direction. **[5]**

Q5) Write short note on any four of the following : **[4 × 2½ = 10]**

- a) Program status word (PSW) register of 8051 microcontroller.
- b) Logical instructions of 8051 microcontroller.
- c) Jump and call instruction in 8051 microcontroller.
- d) SCON register of 8051 microcontroller.
- e) Addressing modes in 8051 microcontroller.
- f) LCD interfacing with 8051 microcontroller.



Total No. of Questions : 5]

SEAT No. :

PE-1504

[Total No. of Pages : 2

[6502]-306

S.Y.B.Sc. (Computer Science)

ELECTRONIC SCIENCE

ELC-232 : Digital Communication and Networking
(Revised 2019) (Semester - III) (23322) (Paper -II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) Question 1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Figures to the right indicate full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Use of calculator is allowed.

Q1) Answer any five:

[5]

- a) Define noise figure.
- b) Write one application of FSK.
- c) State any one advantage of spread spectrum.
- d) Write the full form of 'CSMA'.
- e) What is the use of 'HUB' in networking?
- f) Mention any one advantage of 'Hybrid network'.

Q2) Answer the following:

[2 × 5 = 10]

- a) Design the 'Hamming code' for the message 1101 with odd parity.
- b) Explain the concept of WDM in detail.

Q3) Answer the following:

[2 × 5 = 10]

- a) Explain PCM with necessary diagram.
- b) With necessary diagram explain the OSI reference model.

P.T.O.

Q4) Answer the following:

[2 × 5 = 10]

- a) Explain the detailed classification of 'Noise'.
- b) Differentiate between FDMA and TDMA.

Q5) Write a short note on any four of the following:

[4 × 2½ = 10]

- a) Asynchronous communication.
- b) QAM.
- c) Frequency Hopping Spread Spectrum.
- d) Token passing
- e) Network Topologies.
- f) Ethernet.



Total No. of Questions : 5]

SEAT No. :

PE1505

[Total No. of Pages : 3

[6502]-401

S.Y.B.Sc. (Computer Science)

CS - 241 : DATA STRUCTURES AND ALGORITHMS - II

(Revised 2019 Pattern) (CBCS) (Semester - IV) (24121)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to right indicates full marks.*
- 4) *Your answers will be values as a whole.*

Q1) Answer any Eight of the following.

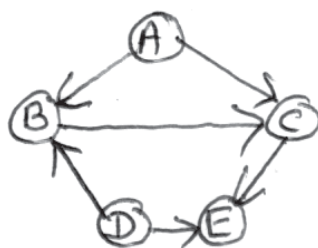
[8×1=8]

- a) What is undirected graph?
- b) What is cycle?
- c) Define topological ordering.
- d) List the binary tree traversal methods.
- e) What is internal node?
- f) What is sibling?
- g) What is synonym.
- h) Define tombstone.
- i) What is multiway search tree?
- j) What is height balanced tree?

Q2) Attempt any Four of the following.

[4×2=8]

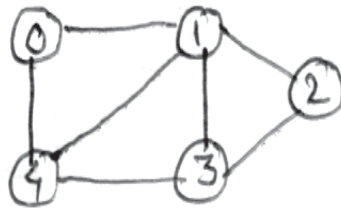
- a) Give in degree, out degree and out degree for each vertex in given graph.



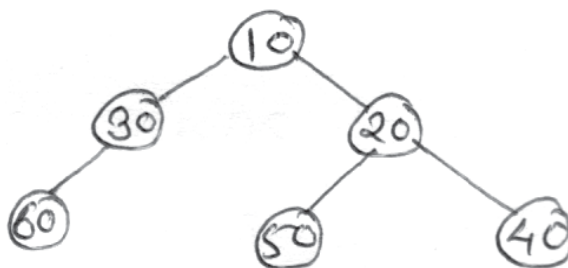
- b) Write a short note on linear probing.

P.T.O.

- c) Give any two difference between B tree and B+ tree.
- d) Give adjacency matrix for given graph.



- e) Give the mirror tree of following tree.

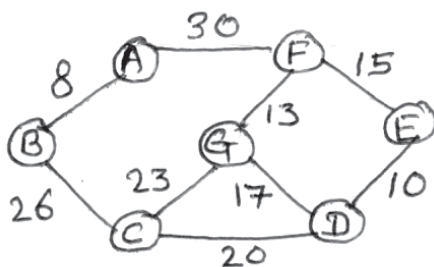


Q3) Attempt any two of the following : **[2×4=8]**

- Write a C function to insert node in Binary Search Tree.
- Write a C function to insert element in hash table. Give proper message if collision occurs.
- Write a C program that accepts the vertices and edges of a graph and store it as an adjacency matrix.

Q4) Attempt any two of the following : **[2×4=8]**

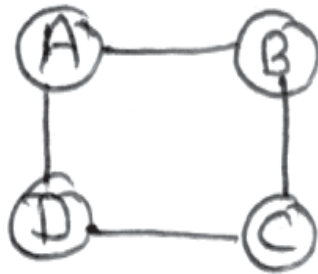
- Explain the preorder traversal with the help of suitable example.
- Build the AVL tree for Sun, Mon, Fri, Thur, Wed
- Construct the minimum spanning tree (MST) for the given graph using Kruskal's algorithm.



Q5) Attempt any one of the following :

[1×3=3]

- a) Construct a Red Black Tree for given data: 2, 1, 4, 5, 9, 3
- b) Give possible Spanning trees that can be created from the given graph.



Total No. of Questions : 5]

SEAT No. :

PE-1506

[Total No. of Pages : 2

[6502]-402

S.Y. B.Sc. (Computer Science)

CS-242 : COMPUTER NETWORKS - I

(Revised 2019) (Semester - IV) (24122)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Neat diagram must be drawn if necessary.

Q1) Attempt any Eight of the following (out of ten) :

[8 × 1 = 8]

- a) What is functions of Presentation layer?
- b) What is Packetizing process.
- c) What are three phases of Mobile IP?
- d) List protocols used at Transport layer.
- e) Give channelization protocols.
- f) What is mean by Jitter?
- g) "UDP is connection oriented protocol". State the statement is true/false.
- h) State components of data communication.
- i) What is size of IPV4 & IPV6 Address?
- j) What is window size of TCP segment?

Q2) Attempt any four of the following (Out of FIVE) :

[4 × 2 = 8]

- a) Explain Bus topology.
- b) Consider a noiseless channel with a bandwidth of 4000Hz transmitting a signal with two signal levels. What will be maximum bit rate?
- c) Identify the class of IP address.
 - i) 192.168.60.12
 - ii) 128.300.4.10
- d) What are different services provided by UDP?
- e) State difference between LAN and WAN.

P.T.O.

Q3) Attempt any two of the following (Out of Three) : **[2 × 4 = 8]**

- a) Explain open & closed loop congestion control mechanism.
- b) Explain UDP Datagram format.
- c) Explain Framing methods.

Q4) Attempt any two of the following (Out of Three) : **[2 × 4 = 8]**

- a) Explain in detail BSS & ESS.
- b) Explain IPV6 Address types.
- c) What is the difference between TCP & UDP.

Q5) Attempt any one of the following (Out of Two) : **[1 × 3 = 3]**

- a) Explain TCP/IP reference model.
- b) Explain classful addressing in detail.



[6502]-403

S.Y. B.Sc. (Computer Science)

MATHEMATICS

MTC-241 : Computational Geometry
(2019 Pattern) (Semester - IV) (24221)

Time : 2 Hours]

[Max. Marks : 35]

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Non-programmable scientific calculator is allowed.

Q1) Attempt any Five of the following :

[5 × 2 = 10]

a) Is $[T] = \begin{bmatrix} \frac{1}{2} & \frac{\sqrt{3}}{2} \\ -\frac{\sqrt{3}}{2} & \frac{1}{2} \end{bmatrix}$ gives a solid body transformation? Justify.

- b) Find angle of notation $\delta\theta$ to generate uniformly spaced 20 points on the circle $x^2 + y^2 = 5$
- c) The area of triangle ABC is 19 sq unit is scaled uniformly by factor 2, then find area of transformed triangle A'B'C'.
- d) Give any two examples of paralld projection.
- e) Write the matrix of translation so that the plane $x = -5$ coincide with yz - plane.
- f) Write any two properties of Be'zier curve.
- g) Write the transformation matrix for overall scalling by factor 3 in three dimensional space.

Q2) Attempt any three of the following :

[3 × 5 = 15]

- a) Find combine transformation matrix (T) for the following sequence of transformations.
 - i) Reflection through the line $y = -x$.
 - ii) Shearing in x and y direction by factors 3 and -4 respectively.
 - iii) Translation in x and y direction by -1 and 2 untis respectively.

Apply [T] on the point P[3 -8]

P.T.O.

- b) Determine the dimetric projection if foreshortening factor along z-axis is $\frac{1}{5}$ with $\phi > 0$, $\theta > 0$
- c) Obtain Combine transformation matrix for the following sequence of transformations.
First translation in x , y and z -direction by factors -1 , 2 , 1 units respectively, followed by rotation about z -axis by 90° , followed by reflection in $z = 0$ plane.
- d) Obtain the combine transformation matrix for rotation about point $p(-2, 3)$ by an angle 45° .
- e) Find combine transformation matrix which gives reflection through the plane $z = 3$.

Q3) Attempt any two of the following :

[2 × 5 = 10]

- a) Find Parametric equation of Bezier curve determined by control points $B_0[2 \ 1]$, $B_1[4 \ 4]$, $B_2[3 \ 2]$, $B_3[2 \ 0]$. Also find Position vector of point at $t = 0.3$.
- b) Generate uniformly spaced three points in first quadrant of the circle $x^2 + y^2 = 9$.
- c) Find the Cavalier and Cabinet Projection of the object represented by position vector matrix $[X]$ with a horizontal inclination $\alpha = -25^\circ$.

$$[X] = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 4 & -1 \\ 2 & 3 & 1 \end{bmatrix}$$



Total No. of Questions : 3]

SEAT No. :

PE-1508

[Total No. of Pages : 4

[6502]-404

S.Y. B.Sc. (Computer Science)

MATHEMATICS

MTC-242 : Operation Research

(2019 Rev.) (Semester - IV) (24222)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicates full marks.

Q1) Attempt any Five of the following :

[5 × 2 = 10]

- a) Write any two limitations of graphical method.
- b) Find any one feasible point of the constraint $x + y \geq 5$.
- c) Find dual of following linear programming problem

Maximize $Z = x + y$

such that $x - y \leq 10$

$x + y \leq 20$

$x, y \geq 0$

- d) Explain the term "unbalanced Assignment problem".
- e) Find minimum transportation cost of transportation problem.

W.H Prod	P	Q	R	Supply
A	1	1	1	20
B	1	1	1	20
C	1	1	1	20
Demand	20	20	20	

P.T.O.

- f) Convert following minimization linear programming problem in to maximization type

$$\text{Minimize } Z = 2x + y$$

$$\text{S.t } x + y \geq 0$$

$$x - y \geq 5$$

$$x, y \geq 0$$

- g) In the set of feasible solution $F = \{-20, -10, 0, 10\}$ find optimum value for minimum cost.

Q2) Attempt any three of the following :

[3 × 5 = 15]

- a) Find optimum solution of following linear programming problem by graphical method.

$$\text{Minimize } Z = 1.5x + 1.75y$$

$$\text{such that } 5x + 5y \geq 20$$

$$5x + 10y \geq 30$$

$$x, y \geq 0$$

- b) Solve following linear programming problem by simplex method.

$$\text{Maximize } Z = 5x + 3y$$

$$\text{such that } x + y \leq 2$$

$$5x + 2y \leq 10$$

$$3x + 8y \leq 12$$

$$x, y \geq 0$$

- c) Obtain initial basic feasible solution of following transportation problem by Least Cost Method.

	P	Q	R	S	
A	6	5	8	5	30
B	5	11	9	7	40
C	8	9	7	13	50
	35	28	32	25	

- d) Solve following Assignment problem for cost minimization.

	P	Q	R	S
A	15	13	14	17
B	11	12	15	13
C	13	12	10	11
D	15	17	14	16

- e) Obtain initial basic feasible solution for minimum cost of following transportation problem by vogels approximation method.

	P	Q	R	S	Supply
A	2	3	11	7	6
B	1	0	6	1	1
C	5	8	15	9	10
Demand	7	5	3	2	

Q3) Attempt any one of the following :

[1 × 10 = 10]

- a) Find initial basic feasible solution of following transportation problem by North west corner rule for minimum cost and then obtain optimum solution by MODI method.

	A	B	C	D	Supply
P	15	10	17	18	2
Q	16	13	12	13	6
R	12	17	20	11	7
Demand	3	3	4	5	

- b) Solve following assignment problem by Hungarian method for minimum cost.

	P	Q	R	S	U	V
A	1	4	6	3	0	0
B	9	7	10	9	0	0
C	4	5	11	7	0	0
D	8	7	8	5	0	0



Total No. of Questions : 5]

SEAT No. :

PE-1509

[Total No. of Pages : 2

[6502]-405

S.Y. B.Sc. (Computer Science)

ELECTRONICS SCIENCE

ELC-241 : Embedded System Design

(Revised 2019 Pattern) (Semester - IV) (24321) (Paper - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any THREE questions from Q.2 to Q.5.
- 3) Figures to the right indicate full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Use of calculator is allowed.

Q1) Attempt any Five :

[5 × 1 = 5]

- a) What is Single Board Computer (SBC).
- b) What is the role of GPU.
- c) Enlist any Two types of operating systems used in Embedded system.
- d) Explain any ONE data type of python with example.
- e) Explain function of TxD and RxD pins.
- f) What is PIR sensor.

Q2) Answer the following :

[2 × 5 = 10]

- a) Explain architecture of system on chip (SOC) with neat block diagram. [5]
- b) State the basic features of Raspbian OS. [5]

Q3) Answer the following :

[2 × 5 = 10]

- a) Explain the features of the Bluetooth module HC-05. [5]
- b) i) Compare Raspberry Pi and Beagle Bone Black SBC's [3]
- ii) Write short note on CPU pipeline stages. [2]

P.T.O.

Q4) Answer the following :

[2 × 5 = 10]

- a) Explain the CPU cache organization. **[5]**
- b) i) What is the role of Time() function in python. **[3]**
ii) Explain function of fingerprint sensor. **[2]**

Q5) Write short note on any Four of the following :

[4 × 2½ = 10]

- a) Raspberry Pi.
- b) Ultrasonic sensor.
- c) Network Access Devices.
- d) PIR Sensor.
- e) Operators in python.
- f) NOOBS.



Total No. of Questions : 5]

SEAT No. :

PE-1510

[Total No. of Pages : 2

[6502]-406

S.Y.B.Sc. (Computer Science)

ELECTRONICS

ELC-242 : Wireless Communication & Internet of Things
(Revised 2019) (Semester - IV) (24322) (Paper -II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) Question 1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Figures to the right indicate full marks.
- 4) Use of calculator is allowed.

Q1) Answer the following in one or two sentence each (Any five) :[5 × 1 = 5]

- a) State the different types of interference in mobile communication system.
- b) How many maximum number of slave devices can be connected in piconet?
- c) State any two examples of sensors used in IoT based irrigation system.
- d) Write the full form of 'SIM' in mobile communication.
- e) State the names of IoT components.
- f) State any one application of GSP.

Q2) Answer the following:

[2 × 5 = 10]

- a) Draw and explain block diagram of LTE.
- b) With the help of suitable diagram explain the ZigBee communication network.

Q3) Answer the following:

[2 × 5 = 10]

- a) Explain in brief the different cloud topologies.
- b) Differentiate between active and passive RFID.

P.T.O.

Q4) Answer the following:

[2 × 5 = 10]

- a) Draw and explain the block diagram of GPRS architecture.
- b) State and explain the challenges in IoT.

Q5) Write a short note on any four of the following:

[4 × 2½ = 10]

- a) Hand-off in cellular telephony.
- b) NB-IoT.
- c) LoRaWAN.
- d) Z-Wave architecture.
- e) Classes of Bluetooth transmitters.
- f) Frequency re-use in cellular telephony.



Total No. of Questions : 5]

SEAT No. :

PE-1511

[Total No. of Pages : 2

[6502]-501

T.Y. B.Sc.

COMPUTER SCIENCE

CS-351 : Operating systems - I

(Rev. 2019) (Semester - V) (CBCS) (Paper - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.

Q1) Attempt any Eight of the following:

[8 × 1 = 8]

- a) What is the purpose of fork () system call?
- b) What do you mean by trap?
- c) State the role of medium term scheduler.
- d) Define process.
- e) "Priority scheduling suffers from starvation." Comment True/False and justify.
- f) What do you mean by thread?
- g) Define race condition.
- h) List types of semaphore.
- i) List various dynamic allocation memory management methods.
- j) Find the physical address for logical address 2,280 having segment length 285 with base address 3000.

Q2) Attempt any Four of the following:

[4 × 2 = 8]

- a) Write the system calls under the category of process management.
- b) List the benefits of thread.
- c) List and explain different CPU scheduling criteria.
- d) What is critical section problem?
- e) What is page table? What are its contents?

P.T.O.

Q3) Attempt any Two of the following:

[2 × 4 = 8]

- a) Write a note on multi-level feedback queue scheduling algorithm.
- b) Consider the following snapshot of a system.

Process	Arrival Time	CPU Burst Time
P1	0	8
P2	1	4
P3	2	9
P4	3	5

Illustrate the execution of these processes using pre-emptive SJF CPU scheduling algorithm. Calculate average waiting time & average turn around time. Also draw the Gantt chart.

- c) Compare MFT and MVT of memory partition.

Q4) Attempt any Two of the following:

[2 × 4 = 8]

- a) What is semaphore? Explain dining philosopher's problem in detail.
- b) Explain one-to-one and many-to-many multithreading models.
- c) Consider the following page reference string:

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 3

How many page faults would occur for the following page replacement algorithms assuming three frames?

- i) FIFO
- ii) LRU

Q5) Attempt any One of the following:

[1 × 3 = 3]

- a) Explain different types of services provided by an operating system.
- b) Define dispatcher. List functions performed by dispatcher.



Total No. of Questions : 5]

SEAT No. :

PE-1512

[Total No. of Pages : 2

[6502]-502

T.Y. B.Sc.

COMPUTER SCIENCE

CS-352 : Computer Networks - II

(Rev. 2019) (Semester - V) (CBCS)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.

Q1) Attempt any Eight of the following:

[8 × 1 = 8]

- a) What is mean by resolver?
- b) How the namespace is organized?
- c) Explain the term Quantization.
- d) Define asymmetric key cryptography.
- e) State any four generic domain.
- f) What is multimedia?
- g) List out the name of two IPsec protocol.
- h) Shortly explain digital signature.
- i) Give the full form of PGP.
- j) State True/False: In tunnel mode. IPsec protects the entire IP packet.

Q2) Attempt any Four of the following:

[4 × 2 = 8]

- a) Write a short note on different types of agents.
- b) Define Diffusion & Confusion.
- c) Explain different types of server.
- d) List out different types of PGP services.
- e) State different types of frames in MPEG.

P.T.O.

Q3) Attempt any Two of the following:

[2 × 4 = 8]

- a) Explain various types of security services.
- b) What is difference between POP3 and IMAP4.
- c) State and explain various SSL services.

Q4) Attempt any Two of the following:

[2 × 4 = 8]

- a) Explain Recursive name address resolution.
- b) State and Explain RTCP message type.
- c) Define firewall. Explain it's types.

Q5) Attempt any One of the following:

[1 × 3 = 3]

- a) Explain first approach of streaming stored audio/vidio.
- b) P and Q are two prime numbers. $P = 7$, $Q = 17$. Take public key $E = 5$. If plain text is 6 then what will be the cipher text value according to RSA algorithm?



Total No. of Questions : 5]

SEAT No. :

PE-1513

[Total No. of Pages : 2

[6502]-503
T.Y. B.Sc.
COMPUTER SCIENCE
CS-353 : Web Technologies - I
(Rev. 2019) (Semester - V)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat diagrams wherever necessary.*

Q1) Attempt any Eight of the following.

[8 × 1 = 8]

- a) What is POP3?
- b) List types of table attribute.
- c) Define trim () function in PHP?
- d) Define the term “Web Browser.”
- e) What is an indexed array in PHP?
- f) What function is used to open a file in PHP?
- g) What does SMTP stand for?
- h) How to insert and remove last element of an array?
- i) Name two basic data types in PHP.
- j) Differentiate between echo () and print ().

Q2) Attempt any Four of the following.

[4 × 2 = 8]

- a) Differentiate between the GET and POST methods in HTTP.
- b) Find the Output

```
<? Php  
$language = "PHP";  
echo 'This is {$language} programming.';  
?>
```
- c) What is use of mail () function? Give syntax.

P.T.O.

- d) Explain the use of Internal CSS with an example.
- e) Find the Output

```
<? php
```

```
$numbers = array (10, 5, 8, 1, 7);
```

```
sort ($numbers);
```

```
print_r($numbers);
```

```
?>
```

Q3) Attempt any Two of the following.

[2 × 4 = 8]

- a) Write a PHP program to read and display the content of text file.
- b) Explain different methods to sort an array in PHP.
- c) Explain types of strings in PHP with examples.

Q4) Attempt any Two of the following.

[2 × 4 = 8]

- a) Create an HTML form for accepting student roll number, name, age, and course. Use proper HTML controls.
- b) Consider the following relational database: Movie (Movie_no, Movie_name, ryear). Write a PHP script which displays all movies name released in the year 2025.
- c) Write PHP Script to accept associative array and sort in ascending order. Display sorted array to user.

Q5) Attempt any One of the following.

[1 × 3 = 3]

- a) Explain Implode() and Explode () functions.
- b) Explain Anonymous function with example.



Total No. of Questions : 5]

SEAT No. :

PE-1514

[Total No. of Pages : 2

[6502]-504

T.Y. B.Sc.

COMPUTER SCIENCE

CS-354 : Foundations of Data Science

(Rev. 2019) (CBCS) (Semester - V)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicates full marks.

Q1) Attempt any eight of the following :

[8 × 1 = 8]

- a) What is the importance of JSON and XML file formats in Data Science?
- b) Enlist different data visualization libraries used in data science.
- c) What is data discretization?
- d) Define mean and median.
- e) What is the importance of hypothesis testing in statistics?
- f) What are outliers in data?
- g) Define Euclidean distance.
- h) What is a boxplot?
- i) Define variance?
- j) What is a pie chart?

Q2) Attempt any four of the following :

[4 × 2 = 8]

- a) Explain how parameter estimation methods work in inferential statistics.
- b) Describe different types of data visualization charts such as Scatter plots and Pie charts.
- c) Describe the significance of word clouds in data visualization.
- d) Explain the problems with unstructured data and how they can be managed.
- e) How can data visualization improve data analysis and decision-making?

P.T.O.

Q3) Attempt any two of the following : **[2 × 4 = 8]**

- a) Explain data transformation techniques such as Rescaling and Normalization.
- b) What is visual encoding? Discuss its importance in data visualization.
- c) Explain different types of data representation methods.

Q4) Attempt any two of the following : **[2 × 4 = 8]**

- a) Discuss the challenges faced while cleaning noisy data.
- b) Explain the role of Dendrograms and Treemaps in visualizing hierarchical data.
- c) What are different data formats used in data science? Provide examples.

Q5) Attempt any one of the following : **[1 × 3 = 3]**

- a) Discuss the advantages of 3D scatter plots and Bubble plots in data visualization.
- b) Differentiate between equal - width binning and equal frequency binning.



Total No. of Questions : 5]

SEAT No. :

PE-1515

[Total No. of Pages : 2

[6502]-505

T.Y. B.Sc.

COMPUTER SCIENCE

**CS-355 : Object Oriented Programming Using Java - I
(Rev.2019 Pattern) (Semester - V) (CBCS) (Paper - V)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

Q1) Attempt any Eight of the following :

[8 × 1 = 8]

- a) What is the use of final keyword?
- b) Explain the term Marker interface.
- c) What is the use of jdbc?
- d) What is Exception?
- e) What is Listener? Name any two.
- f) List any two inheritance types.
- g) List any two use of this keyword.
- h) “Java is compiled and interpreted language” comment.
- i) A class can be declared as final and abstract. State true/false.
- j) What is finally?

Q2) Attempt any four of the following :

[4 × 2 = 8]

- a) Explain any two InputStream classes.
- b) Differentiate abstract class and interface.
- c) Write is the use and syntax of try-catch.
- d) What is method overriding?
- e) Explain any two LayoutManager in java.

P.T.O.

Q3) Attempt any TWO of the following :

[2 × 4 = 8]

- a) Write a program that reads on file name from command line, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
- b) Write a program to accept the name and age from user if age is less than 18 then raise "Invalid Age Exception" with msg "Given user in not illegible for voting".
- c) Write a java program to accept an array of user defined size from user and display it in ascending order.

Q4) Attempt any Two of the following.

[2 × 4 = 8]

- a) What is package? How is it created? Explain with suitable example.
- b) Explain MVC architecture in detail.
- c) What is interface? What are the types of interfaces?

Q5) Attempt any One of the following.

[1 × 3 = 3]

- a) What is Stream? Explain Reader and Writer class.
- b) Explain features of Java.



Total No. of Questions : 5]

SEAT No. :

PE-1516

[Total No. of Pages : 2

[6502]-506

T.Y. B.Sc.

COMPUTER SCIENCE

CS-356 : Theoretical Computer Science

(Rev. 2019) (CBCS) (Semester - V)

Time : 2 Hours]

[Max. Marks : 35

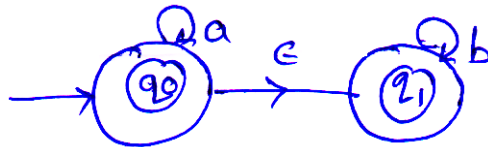
Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.

Q1) Attempt any Eight of the following (Out of ten) :

[8 × 1 = 8]

- a) Define term Empty string with example.
- b) State True or False "DFA do have multiple final state."
- c) Write down the E-closure of each state from the following FA.



- d) Define Unit production.
- e) Which tool is used to prove that the language is not regular.
- f) Write smallest possible string accepted by the following regular expression. $a(a+b)^*ab$
- g) Define δ in case of PDA.
- h) Define right linear grammar.
- i) Give Formal definition of Turing Machine.
- j) Define λ in case of Moore Machine.

Q2) Attempt any four of the following :

[4 × 2 = 8]

- a) Differentiate between FA and PDA.
- b) Construct FA for regular expression. $(a+b)^*bb$.
- c) Explain derivation process with the help of example.
- d) Write a Regular Expressions for a language :
Over $\Sigma\{0,1\}$ such that string start with '01' and end with '10'.
- e) Explain NPDA.

P.T.O.

Q3) Attempt any two of the following (Out of three) : [2 × 4 = 8]

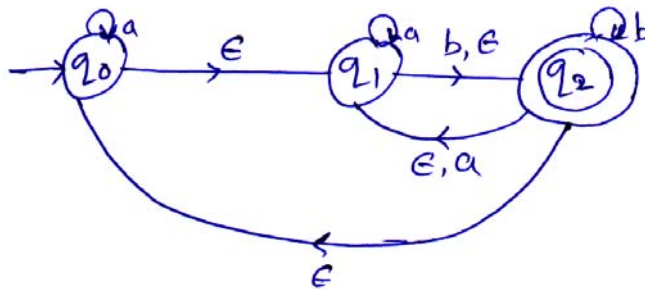
- Construct a DFA for a language which contains all strings ending with "ab" or "bc" over $\Sigma\{a,b,c\}$.
- Convert the following CFG into CNF.
 $S \rightarrow ABA$
 $A \rightarrow aA \mid \epsilon$ (epsilon)
 $B \rightarrow bB \mid \epsilon$ (epsilon)
- Design a TM for a language
 $L = \{a^n b^n \mid n \geq 1\}$

Q4) Attempt any two of the following (Out of three) : [2 × 4 = 8]

- Construct a PDA for a language
 $L = \{a^{2n} b^n \mid n \geq 1\}$
- Design a Mealy Machine for input $(a+b+c)^*$ if input ends with "bac" print A else print 'B'.
- Give the difference between DFA and NFA.

Q5) Attempt any one of the following (Out of two) : [1 × 3 = 3]

- Convert the following NFA with empty moves to DFA.



- Prove $L = \{a^n b^n a^n \mid n \geq 1\}$ is not regular.



Total No. of Questions : 5]

SEAT No. :

PE-1517

[Total No. of Pages : 2

[6502]-507

T.Y. B.Sc. (Computer Science)
CS - 3510 : Python Programming
(Revised 2019) (CBCS) (Semester - V)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Total number of question are five.*

Q1) Attempt any Eight of the following

[8 × 1 = 8]

- a) How do you define a user-defined exception in Python?
- b) How do you read and write files in Python?
- c) What are the operations available for sets in Python?
- d) What is variable-length argument?
- e) How to add mutliple elements at the end of the list?
- f) What is the use of the map() function in Python?
- g) How do you access elements in a list?
- h) How to raise an exception with arguments.
- i) What is a lambda function? Give an example.
- j) What is the use of comments in Python? Provide an example.

Q2) Attempt any FOUR of the following

[4 × 2 = 8]

- a) Why is Python considered a powerful and flexible programming language?
- b) What are lists in Python? Explain different ways to create, access, and modify lists with examples.
- c) Describe different built-in-string methods in Python with examples.
- d) Describe the concept of tuples in Python. How are they different from lists?
- e) What are Python packages? Explain how to create and import a package with examples.

P.T.O.

Q3) Attempt any TWO of the following:

[2 × 4 = 8]

- a) Write a python program to get a string from user and replace all the occurrence of 'a' with \$ in a string.
- b) Write a program to raise a user defined exception to check if age is greater than 21.
- c) Write a python program to display table of given number.

Q4) Attempt any TWO of the following:

[2 × 4 = 8]

- a) Write a python program to perform addition of two 3*3 matrix using function.
- b) Write a Python program to extract year, month, date and time using Lambda.
- c) Write a Python program to modify a list based on these conditions:
 - If a number is **even**, square it.
 - If a number is **odd**, cube it.
 - Return the modified list.

Q5) Attempt any one of the following:

[1 × 3 = 3]

- a) Write a short note on exceptions handling in Python?
- b) Write a short note on modules in Python.



Total No. of Questions : 5]

SEAT No. :

PE-1518

[Total No. of Pages : 2

[6502]-508

T.Y. B.Sc.

COMPUTER SCIENCE

CS-3511 : Blockchain Technology
(2019 Revised) (Semester - V) (CBCS)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.

Q1) Attempt any Eight of the following :

[8 × 1 = 8]

- a) Why is Blockchain a trustworthy approach?
- b) What is a smart contract?
- c) What is DApp?
- d) What is Hybrid Blockchain?
- e) Define EVM.
- f) Define Database.
- g) Define PoW.
- h) What is hard fork?
- i) What is the formula to calculate transaction fee in Ethereum?
- j) What is Block?

Q2) Attempt any four of the following :

[4 × 2 = 8]

- a) What is Blockchain? Explain its importance.
- b) Write short notes on Ether and Gas.
- c) List different types of networks in blockchain.
- d) With the help of diagram describe the process of SHA-256.
- e) Explain the working of mining.

P.T.O.

Q3) Attempt any TWO of the following :

[2 × 4 = 8]

- a) What are the advantages of smart contracts?
- b) Describe the consensus mechanism in detail.
- c) Explain the structure of blocks in Blockchain.

Q4) Attempt any Two of the following.

[2 × 4 = 8]

- a) Which are the different value data types in solidity?
- b) What is the fork? Explain soft and hard forking with diagram.
- c) Describe EVM with the help of a neat diagram.

Q5) Attempt any One of the following.

[1 × 3 = 3]

- a) Differentiate between blockchain and database.
- b) Explain Digital Signature with its working principle.



Total No. of Questions : 5]

SEAT No. :

PE-5513

[Total No. of Pages : 2

[6502]-601R
T.Y. B.Sc. (CS)
CS-361 : OPERATING SYSTEM - II
(Rev. 2019) (Semester - VI)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicates marks.*

Q1) Attempt any eight of the following :

[8 × 1 = 8]

- a) Write the names of any two disk allocation methods of disk space.
- b) List disk performance parameters.
- c) What is cluster computer?
- d) What is cloud computing?
- e) List the different architectural styles of distributed operating systems.
- f) What is kernel?
- g) What is RISC in ARM architecture?
- h) What is starvation?
- i) List file system free space management techniques.
- j) Define claim edge?

Q2) Attempt any four of the following :

[4 × 2 = 8]

- a) What is ARM?
- b) Write the difference between SCAN & LOOK disk scheduling algorithms.
- c) What are the goals of distributed system?
- d) Explain features of mobile operating system.
- e) List down the advantages and disadvantages of windows mobile OS.

P.T.O.

Q3) Attempt any two of the following.

[2 × 4 = 8]

- a) What is deadlock? Explain different ways of deadlock recovery.
- b) Explain resource - allocation graph with example.
- c) Explain access methods of file system management.

Q4) Attempt any two of the following :

[2 × 4 = 8]

- a) Explain the necessary conditions of deadlock with suitable example and diagram.
- b) Consider following snapshot of the system. A, B, C, D are the resource types. Answer the following questions using Banker's algorithm.

	Allocation				Max				Total			
	A	B	C	D	A	B	C	D	A	B	C	D
P ₀	0	0	1	2	0	0	1	2	1	5	2	0
P ₁	1	0	0	0	1	7	5	0				
P ₂	1	3	5	4	2	3	5	6				
P ₃	0	6	3	2	0	6	5	2				
P ₄	0	0	1	4	0	6	5	6				

- i) What are the contents of Need matrix/array?
- ii) If the system is in the safe state, give the safe sequence.
- c) Write a short note on directory structure.

Q5) Attempt any ONE of the following :

[1 × 3 = 3]

- a) Draw the labeled diagram of Disk Structure.
- b) Differentiate between Android OS and iPhone OS.



Total No. of Questions : 5]

SEAT No. :

PE-1520

[Total No. of Pages : 2

[6502]-602
T.Y. B.Sc.
COMPUTER SCIENCE
CS-362 : Software Testing
(Rev. 2019) (Semester - VI) (CBCS)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*

Q1) Attempt any Eight of the following:

[8 × 1 = 8]

- a) Define error.
- b) What do you mean by debugging?
- c) What is driver?
- d) What is black box testing?
- e) Write advantages of load testing.
- f) Define agile testing.
- g) List dimensions of quality?
- h) Define web application testing.
- i) Define system testing.
- j) Give the purpose of software testing?

Q2) Attempt any Four of the following:

[4 × 2 = 8]

- a) Write features of Agile testing.
- b) Explain system testing in detail.
- c) Compare testing and debugging any two points.
- d) Explain Regression testing.
- e) Explain performance of testing.

P.T.O.

Q3) Attempt any Two of the following:

[2 × 4 = 8]

- a) What is test case? Explain with example.
- b) Explain V-Model with diagram.
- c) Describe basic path testing in detail.

Q4) Attempt any Two of the following:

[2 × 4 = 8]

- a) Explain alpha and beta testing in detail.
- b) What is integration testing? Explain any type in detail.
- c) What are the techniques used for web applications testing? Describe any two in detail.

Q5) Attempt any One of the following:

[1 × 3 = 3]

- a) Write a short note on automated tests.
- b) Explain with its types the concept of internationalization testing.



Total No. of Questions : 5]

SEAT No. :

PE-1521

[Total No. of Pages : 2

[6502]-603

T.Y. B.Sc.

COMPUTER SCIENCE

CS-363 : Web Technologies - II

(Rev. 2019) (Semester - VI) (CBCS)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.

Q1) Attempt any Eight of the following:

[8 × 1 = 8]

- a) What is the difference between XML and HTML?
- b) Give any 4 event details which can be handle by JS function.
- c) What are undeclared and undefined variables?
- d) What is AJAX polling?
- e) What are XML attributes?
- f) List the features of CodeIgniter.
- g) List any 4 real web applications of AJAX currently running in the market.
- h) To make the form sticky we use the form value submitted as the default value when we create HTML form. State True or False.
- i) List the limitation of JavaScript.
- j) What is the usage of Application folder in directory structure of CodeIgniter?

Q2) Attempt any Four of the following:

[4 × 2 = 8]

- a) What is the difference between JavaScript and AJAX?
- b) Define Page Redirection.
- c) Which method is feasible to work in jQuery: .empty(), .remove()?
- d) Write the Naming Rules for XML.
- e) What is the use of header()? Explain header attribute used to SET Response Header.

P.T.O.

Q3) Attempt any Two of the following:

[2 × 4 = 8]

- a) Explain DOM Manipulation Methods used in jQuery with proper example.
- b) How server-side state management done using PHP?
- c) Explain MVC Architecture.

Q4) Attempt any Two of the following:

[2 × 4 = 8]

- a) Write php script to display Mobile details in tabular format using DOMDocument from the file 'MobileDetail.xml' which contain Mobile Brand name, Model, Price, Color, OS.
- b) Add the <p> "Welcome to Animation using jQuery" </p> with CSS property as: {background color - green, font color: Yellow, font size: 20px} after <div> tag, when user clicks on Button.
- c) Write an Ajax Program to get details of Examination when user select Exam Name. Create table Exam (Exam Code, Exam Name, Exam Pattern, Exam Marks).

Q5) Attempt any One of the following:

[1 × 3 = 3]

- a) Explain working with Database in CodeIgniter.
- b) What is self-processing page in PHP? Explain with proper example.



Total No. of Questions : 5]

SEAT No. :

PE-1522

[Total No. of Pages : 2

[6502]-604

T.Y. B.Sc. (Computer Science)
CS-364 : DATA ANALYTICS
(Rev. 2019) (Semester - VI)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Total No. of questions are five.*

Q1) Attempt any EIGHT of the following. (Out of Ten)

[8 × 1 = 8]

- a) Define the term classifier.
- b) Logistic Regression is used for solving classification problems. Comment.
- c) List the applications of NLP.
- d) What is the purpose of AOC-ROC curve.
- e) What is the purpose of KNN algorithm.
- f) What is expert finding?
- g) What is the purpose of Apriori Algorithm.
- h) What is maximal itemsets?
- i) What is n-gram?
- j) What is the role of machine learning algorithms in data analytics?

Q2) Attempt any FOUR of the following. (Out of Five)

[4 × 2 = 8]

- a) Differentiate between prescriptive & predictive data analytics?
- b) Explain in detail : Social Media analytics.
- c) Explain the concept of sentiment analysis.
- d) Write a short note on stop words.
- e) What is Tokenization? How to use it in NLP? Explain in detail.

P.T.O.

Q3) Attempt any TWO of the following. (Out of Three) **[2 × 4 = 8]**

- a) Explain in detail : Market Basket Analysis.
- b) Explain any four techniques of clustering in detail.
- c) What is analytics? Explain the types with example.

Q4) Attempt any TWO of the following. (Out of Three) **[2 × 4 = 8]**

- a) What is classification? Explain its types.
- b) Differentiate between Associations and correlations.
- c) Write a short note on NLP.

Q5) Attempt any ONE of the following. (Out of Two) **[1 × 3 = 3]**

- a) Consider following database and compute the frequent item sets using Apriori algorithm with minimum support count as 2

Transaction	Items Purchased
T1	{hairoil, shampoo, lotion}
T2	{shampoo, hairoil, scrub}
T3	{Shampoo, lotion, cream}
T4	{hairoil, cream}
T5	{Shampoo, cream, scrub}

- b) What is text analytics? Describe its steps diagrammatically, advantages, disadvantages and applications.



Total No. of Questions : 5]

SEAT No. :

PE-1523

[Total No. of Pages : 2

[6502]-605

T.Y. B.Sc.

COMPUTER SCIENCE

CS-365 : Object Oriented Programming Using java - II
(Rev.2019) (Semester - VI) (CBCS) (Paper - V)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

Q1) Attempt any Eight of the following (Out of Ten) :

[8 × 1 = 8]

- a) Define Collection interface.
- b) What are the methods of interThread Communication?
- c) What is use of set Auto Commit()?
- d) What are types of servlet?
- e) List implicit objects in JSP.
- f) List JDBC drivers.
- g) Give the name of JDBC Components.
- h) Define List Iterator Interface.
- i) What is HashSet?
- j) List Session tracking mechanisms in servlets.

Q2) Attempt any Four of the following (Out of Five) :

[4 × 2 = 8]

- a) What are the ways to create thread?
- b) Write differences between Statement and Prepared Statement interface.
- c) Difference between List and Set interface.
- d) Write any two JSP Scripting elements with proper syntax and uses.
- e) What are the advantages of spring?

P.T.O.

Q3) Attempt any Two of the following (Out of Three) : **[2 × 4 = 8]**

- a) Write JDBC program to accept department name and display details of employee (eId, eName, eDesignation, eSalary) having maximum salary.
- b) Write a java program in multithreading to display all the alphabets between 'A' to 'Z'. Each alphabet should display after four seconds.
- c) Write a JSP script to display factorial of given number and display the result in red colour.

Q4) Attempt any Two of the following (Out of Three) : **[2 × 4 = 8]**

- a) Write a servlet program to count the number of times a servlet has been invoked [use cookies].
- b) Explain life cycle of thread.
- c) Explain spring framework architecture with suitable diagram

Q5) Attempt any One of the following (Out of Two) : **[1 × 3 = 3]**

- a) Explain JDBC architecture with suitable diagram.
- b) Write a java program to display names of friends in alphabetical order using suitable collection.



Total No. of Questions : 5]

SEAT No. :

PE-1524

[Total No. of Pages : 3

[6502]-606

T.Y. B.Sc. (Computer Science)

CS-366 : COMPILER CONSTRUCTION

(Revised 2019 Pattern) (CBCS) (Semester - VI)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Neat diagram must be drawn wherever necessary.

Q1) Attempt any Eight of the following. (Out of 10)

[8 × 1 = 8]

- a) List all the phases of compiler?
- b) Which one is the most powerful parser in Bottom up parsing?
- c) What is handle pruning?
- d) Define Lexical Analyzer.
- e) Define the term basic block?
- f) Define Boatstropping?
- g) Find the taken for area = $3.14 * r * r$?
- h) State true or false. Bottom up passing uses the process of derivation.
- i) Name the conflict which is not possible in LR passes.
- j) Define SDD (Syntax directed defination)

Q2) Attempt any 4 (four) of the following (Out of 5)

[4 × 2 = 8]

- a) Eliminate Left Recursion from the below grammar.

$E \rightarrow E + T \mid T$

$T \rightarrow T * F \mid F$

$F \rightarrow (E) \mid id$

- b) Difference between synthesized & Inherited attribute?

P.T.O.

- c) Compute LEADING & TRAILING Symbol

$$S \rightarrow (T) \mid a \mid ^$$

$$T \rightarrow T, S$$

- d) Explain any two code optimization technique.

- e) Construct Quadruples for the following

$$(a + b) * (m - n) \uparrow (m + n)$$

Q3) Attempt any two of the following. (Out of 3)

[2 × 4 = 8]

- a) Write a Recursive Descent Parsers (RDP) for the following Parsers :

$$G = (\{A\}, \{\emptyset, 1\}, P, A)$$

$$P : A \rightarrow O A O \mid A 1 \mid A A \mid 1$$

- b) Check whether the given grammar is CLR(1) or not?

$$S \rightarrow AA$$

$$A \rightarrow aA \mid b$$

- c) Check whether the following grammar is LL(1) or not?

$$S \rightarrow S\# \mid aA \mid b \mid cB \mid d$$

$$A \rightarrow aA \mid b$$

$$B \rightarrow cB \mid d$$

Q4) Attempt any TWO of the following. (Out of 3)

[2 × 4 = 8]

- a) Check whether the following grammar is SLR (1) or not

$$S \rightarrow A \mid B$$

$$A \rightarrow aA \mid b$$

$$B \rightarrow dB \mid b$$

- b) Check whether the following grammar is operator precedence or not?

$$E \rightarrow E + E \mid E * E \mid (E) \mid id$$

- c) Consider the following SDD & construct Annotated Parse tree for the input string $4 + 5 + 3$.

Production	Semantic Rule
$E \rightarrow TE'$	$E' \cdot \text{inh} = T \cdot \text{val}$ $E \cdot \text{val} = E' \cdot \text{syn}$
$E' \rightarrow + TE'$	$E'_1 \cdot \text{inh} = E' \cdot \text{inh} + T \cdot \text{val}$ $E' \cdot \text{syn} = E'_1 \cdot \text{syn}$
$E' \rightarrow \epsilon$	$E'_1 \cdot \text{syn} = E'_1 \cdot \text{inh}$
$T \rightarrow \text{digit}$	$T \cdot \text{val} = \text{digit} \cdot \text{Lexval}$

Q5) Attempt any one of the following (out of 2)

[1 × 3 = 3]

- Write a LEX program to count the vowels from given string?
- Construct DAG for the following
 - $(a + (a * (b - c)) + ((b - c) * d))$
 - $y + (y + x) / (x - z) * (x - z)$

